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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/005,363	11/08/2001	Reinhold Kraus	22750/502	7893

26646 7590 03/27/2003

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EXAMINER

PICKARD, ALISON K

ART UNIT	PAPER NUMBER
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3676

DATE MAILED: 03/27/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/005,363

Applicant(s)

KRAUS, REINHOLD

Examiner

Alison K. Pickard

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Borrino (5,529,315) in view of Matsumoto (6,528,168).

Borrino discloses a mechanical seal comprising a sliding ring 100 attached to a shaft for rotation by an o-ring 158, and a non-rotating backing ring 110 attached to a housing 128 by an o-ring 124. A spring 146 presses the rings together to form a seal. Borrino discloses that the sliding ring is made of carbon and the backing ring 110 is made of silicon carbide (see col. 10, lines 20-21). Borrino does not disclose that one of the rings is made of a carbon/silicone carbide composite material. Matsumoto teaches a carbon/silicone carbide composite material that is used for sliding members because of its excellent resistance to wear and self-lubricating properties. Matsumoto teaches using a carbon substrate (i.e. ring 100) and forming a C/SiC layer on the surface. The silicon conversion rate is in a range of 50 to 30% (col. 3, lines 16-20), which falls within the 60 to 15% range required by the claims. (Likewise, the carbon content falls in the required range.) Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the carbon ring 100 of Borrino by forming the C/SiC composite material as taught by Matsumoto to provide excellent self-lubricating and wear resistance.

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3. Claims 5-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Borrino in view of Matsumoto as applied to claims 1-4 above, and further in view of Divakar (5,834,387).

Neither Borrino nor Matsumoto disclose a silicon carbide wit a pore size not greater than $60\mu\text{m}$ at porosity of 2 to 15% or the roughness values required by the claims. Divakar teaches optimum pore size, porosity, and roughness for mechanical seal members. Divakar teaches forming a silicon carbide ring with a mean pore size of not greater than $60\mu\text{m}$ (the range 50 to 500 covers 60 and below, see col. 3, lines 33-36) at a porosity of 2 to 12%, which is within 2 to 15% required by the claims. Divakar teaches that this pore size and porosity improves the rings ability to retain a hydrodynamic film and thus ensure a better seal. Divakar also teaches that a surface roughness of $0.03\mu\text{m}$ (falls within both ranges, col. 12, lines 4-5) improves the sealing ability and wear rate. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the mechanical seal of Borrino in view of Matsumoto with the porosity, pore size, and surface roughness taught by Divakar to ensure a better seal that retains a good hydrodynamic film and has an improved wear rate.

Conclusion

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alison K. Pickard whose telephone number is 703-305-0882. The examiner can normally be reached on M-F (9-6:30), with alternate Friday's off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Anthony Knight can be reached on 703-308-3179. The fax phone numbers for the

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organization where this application or proceeding is assigned are 703-872-9326 for regular communications and 703-8729327 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 308-1113.



Alison K. Pickard

Examiner

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AP

March 23, 2003